

## Debbie Beadle

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**From:** Greg Krabbe <gkrabbe@comcast.net>  
**Sent:** Friday, September 07, 2012 9:00 AM  
**To:** Debbie Beadle  
**Subject:** NPDES analysis  
**Attachments:** NPDES analysis - final.pdf  
  
**Categories:** Waiting Recall

Debbie,

*Below is an email to Evan requesting that a document submitted for the PC ECA discussions record be replaced with a corrected document. I see that Evan is out on vacation and would ask that you make the correction.*

*Let me know if this is the right course.*

*Thanks*

*Greg Krabbe*

Evan,

There was an error in the NPDES analysis letter that I sent you; the date is was wrong and an explanation of a method used to clean up the data sets was later abandoned. This one has been corrected. Please replace the one I sent you yesterday with this one. Call if you need clarification.

Thanks for your help with this.

Greg Krabbe  
GFK Consulting Inc  
425 347 2898

EXHIBIT NO. 201

# GFK Consulting

Land Development Services

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September 7, 2012

City of Sammamish Planning Commission and Staff,

I have been asked to assess the effectiveness of current erosion control techniques in order to provide some insight into the risk to Lake Sammamish water quality by allowing regulated development to occur in the area now designated as a “no disturbance” area. In order to do this, I have analyzed the permitting, reporting and violation data kept by the Department of Ecology (DOE) as part of their National Pollutant Discharge Elimination System (NPDES) general permit for construction stormwater impacts. This letter will serve to explain and present my findings.

## **Background**

The NPDES program is a federal requirement under the Clean Water Act, managed nationally by the U.S. Environmental Protection Agency and delegated in Washington state to the DOE. NPDES permits authorize a variety of activities to discharge into state and federally protected waters. There are different types and categories of NPDES permits, but the one I have focused on here is the *Construction Stormwater General Permit*, which authorizes discharges from construction activities. Generally speaking, these permits are issued prior to construction in parallel with local agency grading and building permitting, and include an erosion control and water quality monitoring plan. A typical scenario would be as follows:

- Construction plans are submitted to local agency
- A grading and erosion control plan are submitted and approved
- Application for coverage under the NPDES Construction Stormwater General Permit is made to the DOE
- When all relevant permits are issued, construction begins along with appropriate erosion control measures and monitoring.
- When construction is completed and the site erosion potential stabilized, the site is inspected and the NPDES permit is closed.

As with activity types, the DOE also monitors for a variety of pollutants as part of the NPDES program. These include but are not limited to:

- Biochemical Oxygen Demand
- Iron
- Nitrogen
- pH
- Silver
- Turbidity

Turbidity monitoring is the most common for the kind of grading and construction we would associate in the vicinity of Lake Sammamish and it is the subject of this investigation. Turbidity is the measure of the transparency of water.

Turbidity monitoring locations are established as part of the NPDES process and are at locations where site runoff is likely to concentrate such as streams and culverts immediately downstream of construction activity. Monitoring is typically measured using Nephelometric Units or NTUs . When turbidity exceeds 25 ntu, it is flagged as a “Benchmark Exceedence”, from this point, the monitored project has 3 days to correct the problem before it becomes a full violation and ultimately an enforcement action. Natural stream turbidity runs around 5-10 ntu.

### **Study Approach**

The analysis presented here looks at the records for benchmark exceedence in King County to provide a statistically significant sample and the City of Sammamish to verify the relevance of the results. The goal is to compare the total number of permit days to the number of permit days with turbidity exceedence reports (a “permit day” being a day during which a given permit was active). For example, an NPDES permit in force between May 1<sup>st</sup> 2010 and November 1<sup>st</sup>, 2010 would comprise 184 permit days. This study evaluates all the permit days for all permits in force between the dates of January 1<sup>st</sup>, 2009 and July 11<sup>th</sup>, 2012.

Monitoring and enforcement data was collected from the DOE's Water Quality Permitting and Reporting Information System (PARIS)

<https://fortress.wa.gov/ecy/wqreports/public/f?p=110:300:3493633522474971:::>

Permit data was secured directly from the DOE through a public information request. All three data sets were received electronically in a spreadsheet format and are attached.

The permitting data set did not include site specific details such as slope and soil type, which would have allowed us to specifically evaluate sites with highly erosive soils. There is also no way to confirm that a given site was actually being graded during a specific period of the permit. However, reasonable assumptions were made to help correct for this, which will be discussed later in the report.

Data received also required some amount of adjustment due to what appear to be data entry errors. As a first step, all reported exceedence incidents were matched up with permitting data as a second way to verify a project's active period. After this, adjustments were made to make the permit data useable. Corrections were made such that permits without exceedence reports were either eliminated or shortened as much as possible to skew the data toward fewer days without exceedence.

Exceedence reports with identical dates and permit numbers were considered duplicates and removed from analysis. It is possible that these represented multiple monitoring locations at a single project, but there is not direct information to this effect in the permit data supplied.

A detailed summary of the data set corrections is included in the "Introduction" tab of the spreadsheet.

### **Findings**

The findings are as follows:

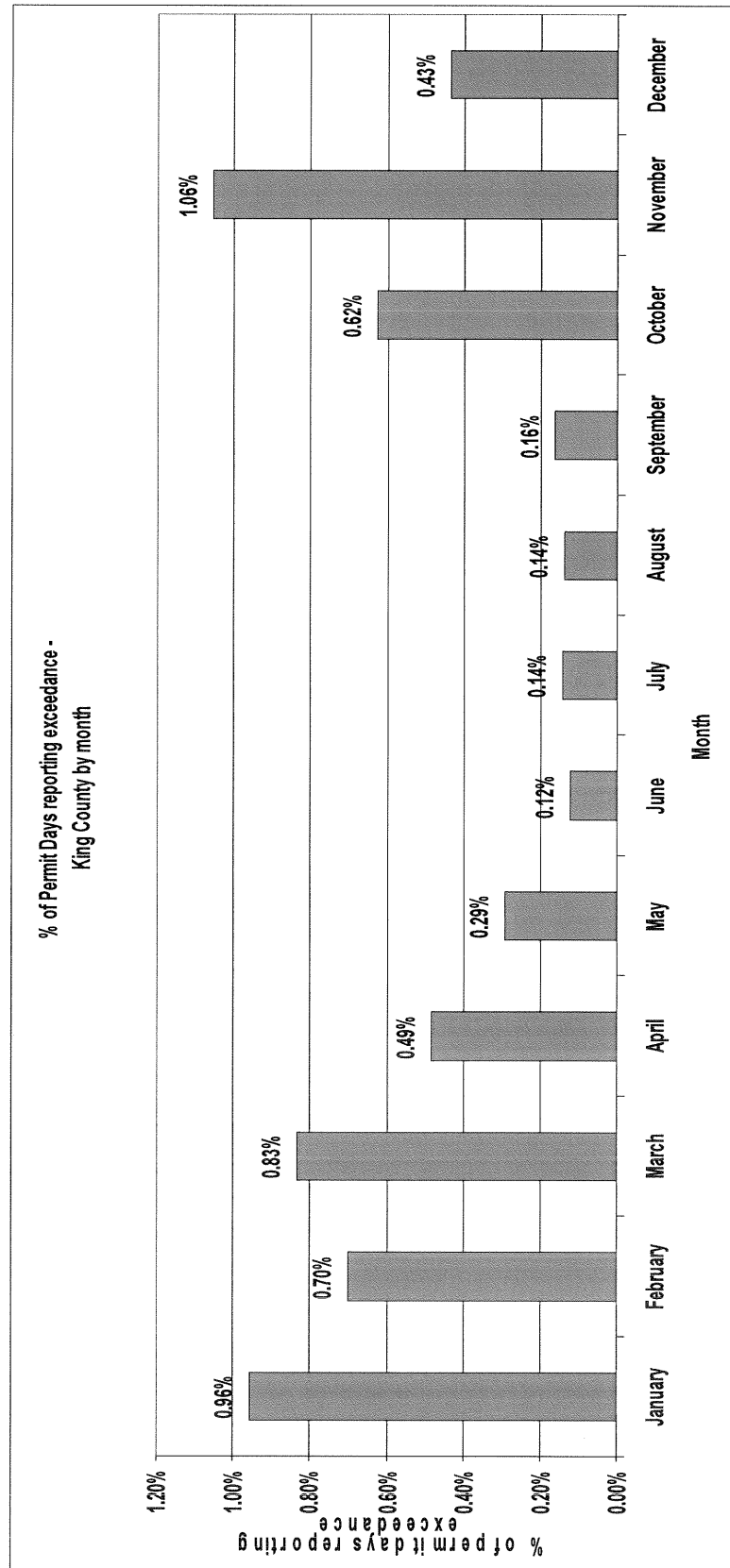
There were 851 NPDES Construction Stormwater General Permits in force within King County at some time between January 1<sup>st</sup> 2009 to July 11<sup>th</sup> 2012. 654 or 77% of those reported one or more exceedence events during the time period. Of those with some exceedence, 380 or 27% of all the permits had enforcement actions taken by the DOE. However, only two permits received fines from the DOE.

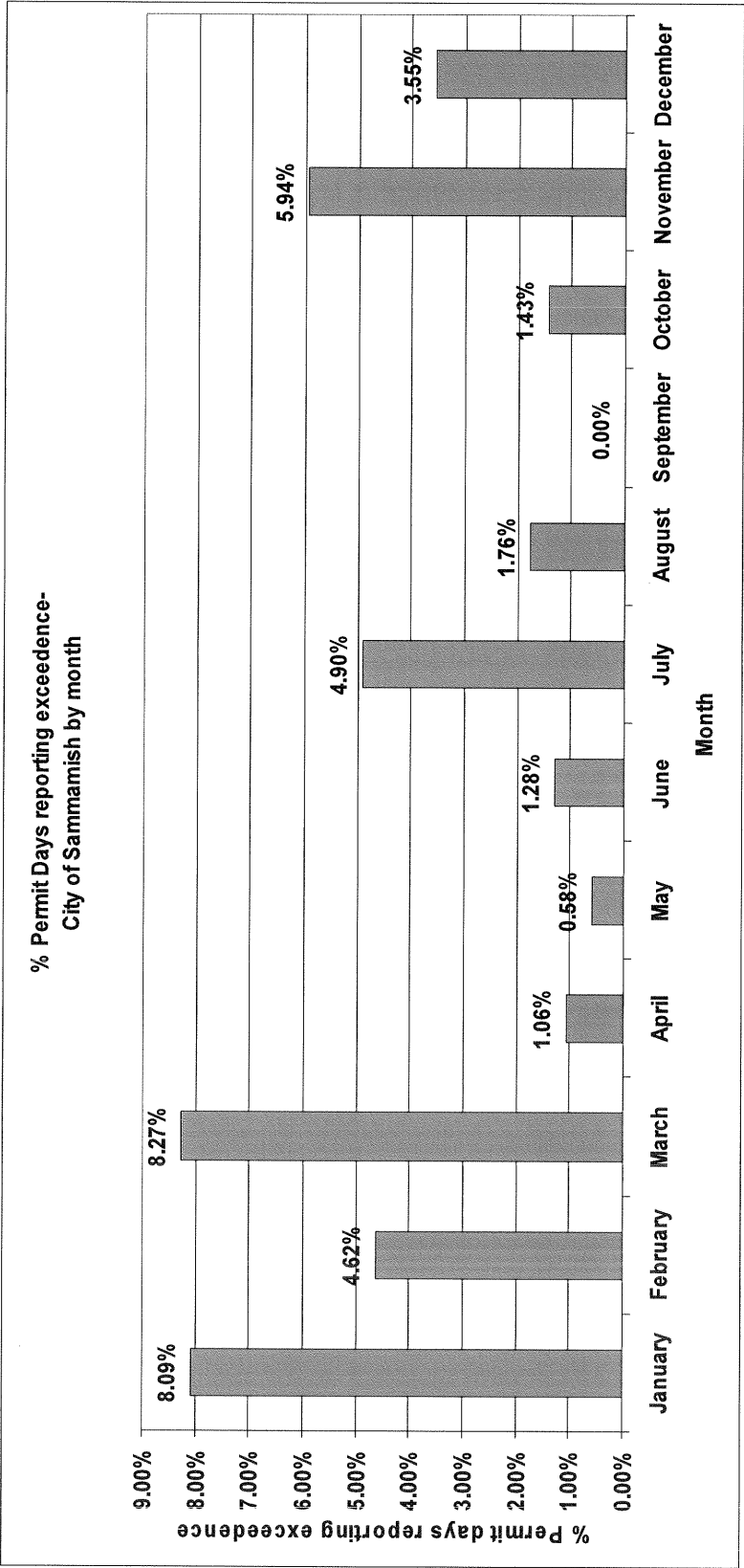
Although the percentage of permits with any exceedence could be considered relatively high, the number of permit days with exceedences is very low. The study period represents 286,393 total permit days. Of those days, 1403 or 0.49% were reported in exceedence of the Turbidity requirements set by the permit.

Results for the City of Sammamish are generally better:

There were 38 NPDES Construction Stormwater General Permits in force within the City of Sammamish at some time between January 1<sup>st</sup> 2009 to July 11<sup>th</sup> 2012. 12 or 32% of those reported one or more exceedence events during the time period. Of those, 14 or 13% of all the permits had enforcement actions taken by the DOE. This period of time represents 14,211 permit days. Of those days, 108 or 0.76% were reported in exceedence of the Turbidity requirements set by the permit.

For an understanding of how these statistics vary by season, we have plotted out the percentage of days in exceedence on a monthly basis:





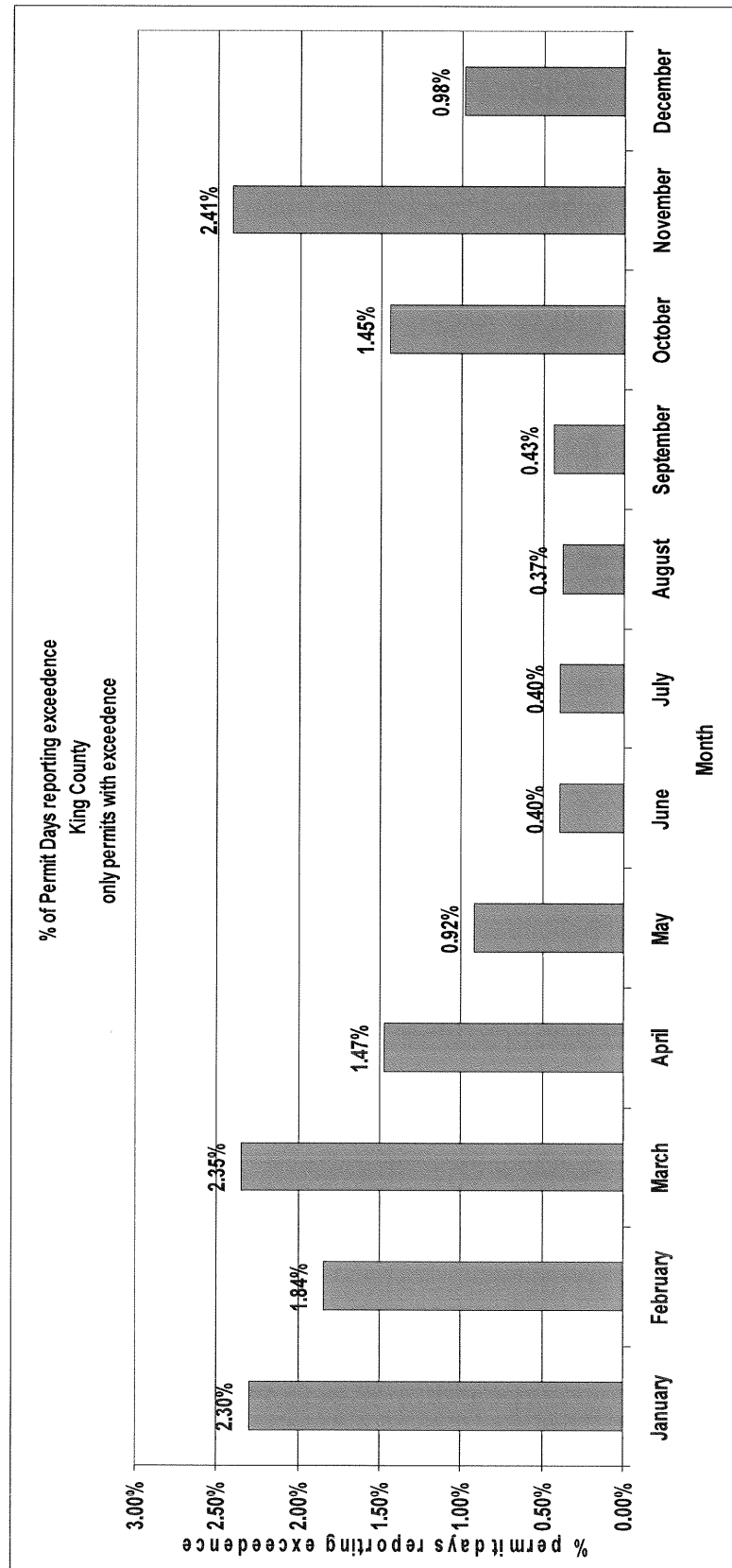
A more conservative analysis would be to look at only those projects that reported exceedence days. This assures that the projects underlying the permits are active and are likely to comprise projects with more challenging erosion control features such as erodible soils and steep slopes.

Results for this data set are as follows:

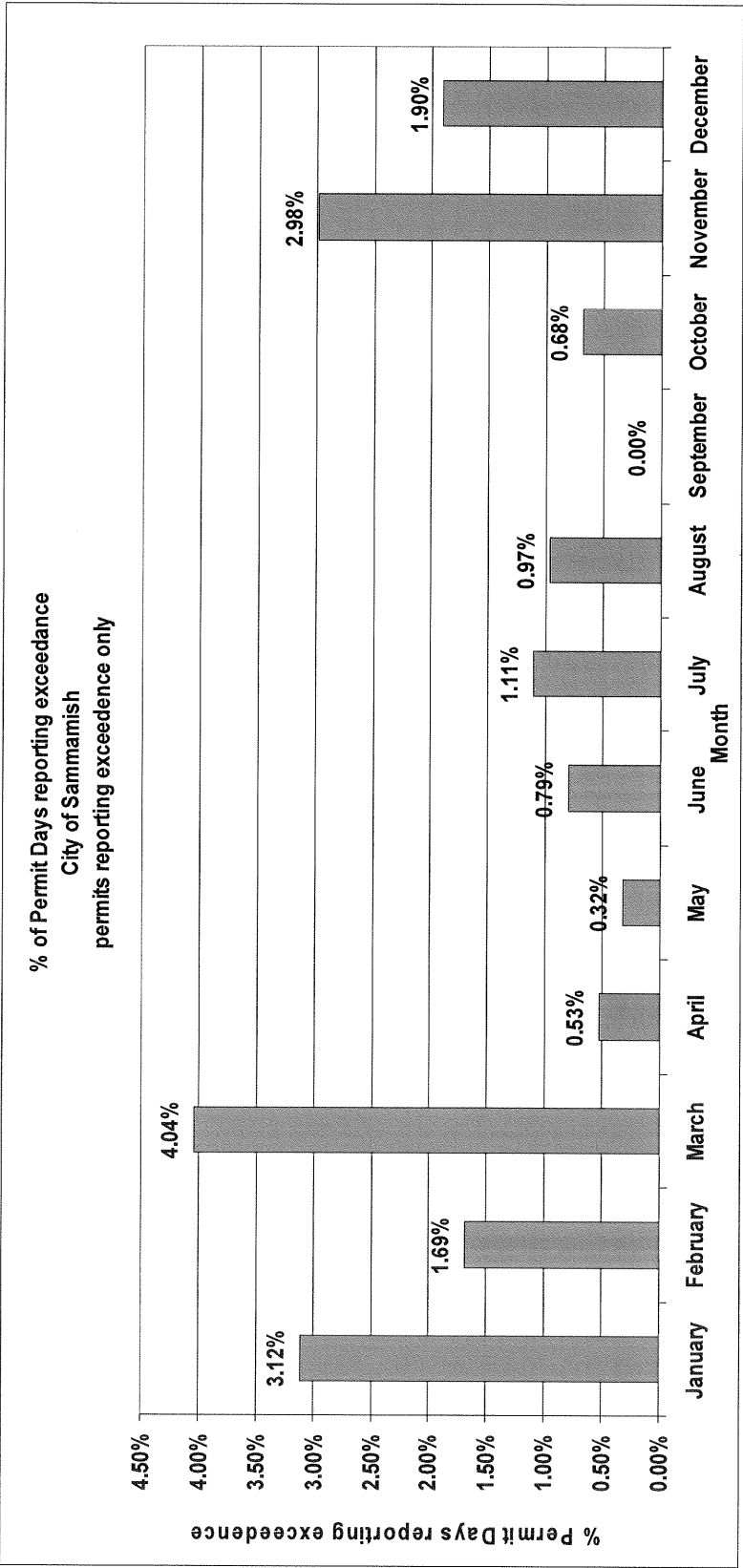
There were 654 NPDES Construction Stormwater General Permits in force within King County that reported Turbidity Exceedence at some time between January 1<sup>st</sup> 2009 to July 11<sup>th</sup> 2012. This period of time represents 103,533 permit days, of those days, 1,403 or 1.36% were reported in exceedence of the Turbidity requirements set by the permit.

There were 46 NPDES Construction Stormwater General Permits in force within The City of Sammamish that reported Turbidity Exceedence at some time between January 1<sup>st</sup> 2009 to July 11<sup>th</sup> 2012. This period of time represents 7,202 permit days, of those days, 108 or 1.50% were reported in exceedence of the Turbidity requirements set by the permit.

The seasonality of the exceedences from those projects that reported exceedence days is presented in the graphs below.







**Conclusions**

Conclusions we can draw from this:

- The existing best management practices applied under the NPDES Construction Stormwater General Permit and the monitoring, reporting and enforcement mechanisms under that permit are very effective at controlling sediment transport and minimizing risks to water quality from construction sites.
- On average, construction sites comply with turbidity standards on more than 99.5% of all permit days. Virtually all turbidity exceedence events are effectively controlled within 3 days. The sediment transport model, previously submitted to the City, confirms that the small amount of sediment transport during 1-3 days of turbidity exceedences will not cause adverse water quality impacts to Lake Sammamish.
- The vast majority of exceedences of the turbidity standard occur October through May. As such, strict seasonal construction limits could eliminate most turbidity exceedences from construction sites and would be an effective regulatory tool for further reducing potential risks to water quality impacts from construction activities.

Sincerely



Greg Krabbe, PE  
President

This spreadsheet has been assembled in an attempt to evaluate current construction erosion control practices and the effectiveness of the NPDES permitting and monitoring program as it pertains to Construction practices as part of a presentation to the City of Sammamish Planning Commission.

The assumed study period for this is from January 1<sup>st</sup> 2009 until July 11<sup>th</sup> 2012. This time period was selected to be representative of the most current practices and still produce approximately 1000 active permits within King Co to represent a reasonable statistical sample. The only permits considered were "Construction Stormwater general permits".

The goal is to compare active permits against reported instances of erosion and pollutant transport; % of permits with erosion reports, % of permit days with erosion reports etc.

This study is based on data collected from the Wa DOE's "PARIS" data base online:

<https://fortress.wa.gov/ecy/wqreports/public/f?p=110:300:3455016599976538::::>

And data sent in the form of a spreadsheet from Becky Powell (BPOW461@ECY.WA.GOV) at the DOE resulting from a formal public information request.

The raw data sets received via both sources are included in separate sheets within this spreadsheet. Edited versions of the raw data were ultimately used for the analysis and are also included in separate sheets. Raw data was received for the entirety of King , Pierce and Snohomish Counties, sheets unique to King County and the City of Sammamish were extracted from this raw data. The "raw" data as downloaded is denoted in the sheet titles.

Subsequent organization of the data revealed a variety of issues that required corrections. These were as follows:

Permits with "draft status"

Duplicate data records

Permits listed as inactive with end dates prior to the study period

Permits listed as inactive with end dates after the study period

Permits listed as active with end dates prior to the study period

Permits that had no beginning or end dates.

Corrections were made such that permits without exceedenc report were either eliminated or shortened as much as possible to skew the data toward fewer days without exceedence.

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As a first test all exceedence reports were matched up to the permits and it was assumed that all permits with exceedence reports were active during the study period and any discrepancies in data entry were corrected to preserve all permits with exceedenc report to again skew data toward exceedenc days.

Corrections are as follows:

Permits with "draft status" – 9 erased

Duplicate data records – 478 erased

221 permits matched to exceedenc reports. 38 had no end dates- end dates set to last exceedence date.

Permits listed as active with no exceedence report and no end date- 31 were set to end dates of study period.

Permits listed as active with no exceedence report and no start or end date- 6 were set to start and end dates of study period.

Permits listed as Inactive with end dates prior to study period- 167 were erased.

(October 1<sup>st</sup>) nearest to start date. 4 resulted in end dates prior to study period and were erased.

Inactive permits with no start or end dates- 133 were erased.

In addition, a handful of entries were corrected for transposed date entries.

A description of all corrections is listed by each permit in the "King Co Permit Edited" sheet.

All edited data sets are denoted as "edited" in the sheet titles. There is also one "working sheet" that was used to test various sorting routines to speed identification of duplicates, permit / exceedence matchs etc. Most of these routines are included in the columns after the permit data in the edited sheets.

Once matched with individual permits, the exceedence report data sets were relatively free of detectable errors- all exceedence reports matched up with permits, and any discrepancy between report dates and permit dates was corrected in the permit data sets- the exceedence report dates took precedence over the listed start and end dates in the permit data sets.

Once the data was corrected, analysis was simple; first overall statistice were pulled from the data such as total number of permits and total number of exceedence reports etc. As a way of presenting the data in a statistically meaningful way, I chose to compare the reported exceedence days to the total number of days a permit was in force, or "permit days" as a way to demonstrate the probability or risk of having an erosion control incident over a given number of days. Then, these overall measures were sorted by month to provide a clear

The resulting conclusions and graphs are represented in the adjacent sheet tab.

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conclusions.

Sincerely

A handwritten signature in black ink, appearing to be 'J. F. Miller' or similar, written in a cursive style.

President

unlock

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